

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE  
BEFORE THE BOARD OF PATENT APPEALS AND INTERFERENCES

Applicant:	SHEN	Patent Application
Application No.:	10/603,428	Group Art Unit: 2621
Filed:	June 24, 2003	Examiner: Findley, Christopher G.
For:	METHODS AND SYSTEMS FOR SERVICING STREAMING MEDIA	

APPEAL BRIEF

## Table of Contents

	<u>Page</u>
Real Party in Interest	1
Related Appeals and Interferences	2
Status of Claims	3
Status of Amendments	4
Summary of Claimed Subject Matter	5
Grounds of Rejection to Be Reviewed on Appeal	7
Argument	8
Conclusion	20
Appendix - Clean Copy of Claims on Appeal	21
Appendix – Evidence Appendix	26
Appendix – Related Proceedings Appendix	27

I. Real Party in Interest

The assignee of the present invention is Hewlett-Packard Development Company,  
L.P.

## II. Related Appeals and Interferences

There are no related appeals or interferences known to the Appellant.

### III. Status of Claims

Claims 1-27 are rejected. This Appeal involves Claims 1-27.

#### IV. Status of Amendments

All proposed amendments have been entered. An amendment subsequent to the Final Action has not been filed.

## V. Summary of Claimed Subject Matter-

Independent Claims 1, 10 and 19 of the instant application pertain to embodiments associated with receiving multiple description media streams.

As recited in Claim 1, “[a] method for servicing streaming media” is described. This embodiment is depicted at least in Figure 6 that “shows a flowchart 600, illustrating computer controlled methods of servicing streaming media according to one embodiment of the present invention” (page 24, lines 10-12). “At step 601, a streaming data input is received. It should be appreciated that the input data may be supplied from a remote server, local storage medium, remote storage medium, etc.” (page 25, lines 1-3). “At step 603, an allocation of available processing and memory resources is determined” (page 25, lines 5-6). “At step 605, a multi stage service is performed on the data received in step 601 based on the resource allocation determined in step 603” (page 25, lines 11-12). “At step 607, an intermediate result from one of the stages of said multi-stage process is cached. The intermediate result is selected according to the available processing and memory resources” (page 25, lines 16-18).

As recited in Claim 10, “[a] computer useable medium stored thereon a computer program directed to cause a computer to execute a method” is described. This embodiment is depicted at least in Figure 6 that “shows a flowchart 600, illustrating computer controlled methods of servicing streaming media according to one embodiment of the present invention” (page 24, lines 10-12). “At step 601, a streaming data input is received. It should be appreciated that the input data may be supplied from a remote server, local storage medium, remote storage medium, etc.” (page 25, lines 1-3). “At step 603, an allocation of

available processing and memory resources is determined” (page 25, lines 5-6). “At step 605, a multi stage service is performed on the data received in step 601 based on the resource allocation determined in step 603” (page 25, lines 11-12). “At step 607, an intermediate result from one of the stages of said multi-stage process is cached. The intermediate result is selected according to the available processing and memory resources” (page 25, lines 16-18).

As recited in Claim 19, “[a] device for servicing streaming data” is described. This embodiment is depicted at least in Figure 6 that “shows a flowchart 600, illustrating computer controlled methods of servicing streaming media according to one embodiment of the present invention. The flowchart 600 include processes which, in one embodiment, are carried out by processors and electrical components under the control of computer readable and computer executable instructions. The computer readable and computer executable instructions reside, for example, in data storage features such as computer usable volatile memory and/or computer usable non-volatile memory” (page 24, lines 10-17). “At step 603, an allocation of available processing and memory resources is determined” (page 25, lines 5-6). “At step 605, a multi stage service is performed on the data received in step 601 based on the resource allocation determined in step 603” (page 25, lines 11-12). “At step 607, an intermediate result from one of the stages of said multi-stage process is cached. The intermediate result is selected according to the available processing and memory resources” (page 25, lines 16-18).



## VI. Grounds of Rejection to Be Reviewed on Appeal

1. Claims 1-27 are rejected under 35 U.S.C. § 101 as being directed to non-statutory subject matter.
2. Claims 1-5, 9-14 and 19-23 are rejected under 35 U.S.C. § 103(a) as being unpatentable over U.S. Patent No. 6,999,512 by Yoo et al., hereinafter referred to as “Yoo,” in view of U.S. Patent No. 6,404,814 by Apostolopoulos et al., hereinafter referred to as “Apostolopoulos.”
3. Claims 6-8, 15-18 and 24-27 are rejected under 35 U.S.C. § 103(a) as being unpatentable over Yoo in view of Apostolopoulos and further in view of “U.S. Patent No. 6,647,061 by Panusopone et al., hereinafter referred to as the “Panusopone.”

## VII. Argument

### 1. Whether Claims 1-27 are directed to non-statutory subject matter.

The Office Action mailed October 31, 2007, states that Claims 1-27 are rejected under 35 U.S.C. §101 as it is asserted that “the claimed invention is directed to non-statutory subject matter” (Office Action mailed October 31, 2007; page 4, section 3). Appellant respectfully submits that the rejection under 35 U.S.C. §101 of Claims 1-27 is improper and should be withdrawn.

#### A. Claims 1-27 produce a useful, concrete and tangible result

Claims 1-27 are rejected under 35 U.S.C. §101 as it is asserted that “[t]he invention as claimed in claims 1-27 does not produce a useful, concrete, and tangible result. In order to produce a useful, concrete, and tangible result, an output step is required” (emphasis added; Office Action mailed October 31, 2007; page 4, section 3).

Appellant respectfully submits that a produced “tangible result” as defined in the MPEP appears to be a tangible result that is produced by the claimed embodiments, and does not require an explicit output step, as asserted. Specifically, Appellant has reviewed related case law, patent laws, patent rules, and the MPEP and does not understand the “produce a tangible result” language to be limited to an output step.

For example, In *re State Street*, 149 F.3d 47 USPQ2d 1596, 1600-1601 (Fed. Cir. 1998), it was held that the transformation of data, representing discrete dollar amounts, by a machine through a series of mathematical calculations into a final share price, constitutes a

practical application of a mathematical algorithm, formula, or calculation, because it produces "a useful, concrete and tangible result"--a final share price momentarily fixed for recording and reporting purposes and even accepted and relied upon by regulatory authorities and in subsequent trades (emphasis added).

Furthermore, MPEP 2106 (2)(b) clearly states that “[t]he tangible requirement does not necessarily mean that a claim must either be tied to a particular machine or apparatus or must operate to change articles or materials to a different state or thing.”

In other words, Appellant respectfully submits that the present invention overcomes the tangible non-statutory subject matter requirements of 35 U.S.C. §101 when the invention produces a real-world result, not when the invention outputs or displays the produced tangible real-world result. That is, Appellant understands tangible result to refer to a result that is capable of being understood and evaluated, and therefore regarded as real.

For the above reasons, Appellant respectfully submits that independent Claims 1 and 10 produce the useful, concrete and tangible result of “caching an intermediate result” and independent Claim 19 produce the useful, concrete and tangible result of “caching an intermediate transcoding result.” Moreover, the result is capable of being understood and evaluated, and therefore should be regarded as real.

Moreover, Appellant respectfully submits that the actual manner in which the produced results of the estimate of the demand system are displayed, e.g., an output step,

output to a screen, printed on a piece of paper, placed in a folder, or otherwise presented, are immaterial as to whether or not the results are tangible.

B. Claims 10-18 are not directed to nonfunctional descriptive material

The Office Action mailed October 31, 2007, asserts that independent Claim 10 is directed toward nonfunctional descriptive material. Appellant respectfully submits that independent Claim 10 is not directed to nonfunctional descriptive material.

First, Appellant notes that Claim 10 recites, in part, “[a] computer useable medium stored thereon a computer program directed to cause a computer to execute a method comprising,” and not “[a] computer useable medium having a computer usable code embodied therein causing a computer to perform operations comprising” as stated in the Office Action mailed October 31, 2007 (page 4; section 3). In particular, a claim amendment in response to the previous Office Action, mailed May 2, 2007, was made to address this rejection.

Second, Appellant notes that the Office Action mailed October 31, 2007, indicates that “Claim 10 should recite “A computer useable medium stored thereon a computer program directed to cause a computer to execute a method comprising...” (emphasis added; page 5, section 3(b)). Therefore, it appears as if the only difference between the proposed Claim 10 and the actual Claim 10 is the use of the terms “readable” and “usable,” respectively.

Appellant respectfully submits that for purposes of providing support for statutory subject matter, the terms “readable” and “usable” are equivalent. Therefore, Appellant respectfully submits that independent Claim 10 is not directed to nonfunctional descriptive material.

Therefore, Appellant respectfully submits the rejection of Claims 1, 10 and 19 under 35 U.S.C. §101 is improper and should be withdrawn. Furthermore, since the rejection under 35 U.S.C. §101 of Claims 1, 10 and 19 is improper and should be withdrawn, the rejection under 35 U.S.C. §101 of Claims 2-9, 11-18 and 20-27 which depend on Claims 1, 10 and 19 is also improper and should be withdrawn.

2. Whether Claims 1-5, 9-14 and 19-23 are unpatentable over Yoo in view of Apostolopoulos.

The Final Office Action mailed October 31, 2007, states that Claims 1-5, 9-14 and 19-23 are rejected under 35 U.S.C. § 103(a) as being unpatentable over Yoo in view of Apostolopoulos. The Appellant has reviewed Yoo and Apostolopoulos respectfully submit that embodiments of the instant application are patentable over Yoo or Apostolopoulos, alone or in combination, for at least the following rationale.

“As reiterated by the Supreme Court in *KSR*, the framework for the objective analysis for determining obviousness under 35 U.S.C. 103 is stated in *Graham v. John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966). Obviousness is a question of law based on underlying factual inquiries” including “[a]scertaining the differences between the claimed invention and the prior art” (MPEP 2141(II)). “In determining the differences between the prior art and the claims, the question under 35 U.S.C. 103 is not whether the differences themselves would

have been obvious, but whether the claimed invention as a whole would have been obvious” (emphasis in original; MPEP 2141.02(I)). Appellant notes that “[t]he prior art reference (or references when combined) need not teach or suggest all the claim limitations, however, Office personnel must explain why the difference(s) between the prior art and the claimed invention would have been obvious to one of ordinary skill in the art” (emphasis added; MPEP 2141(III)).

Appellant respectfully submits that “[i]t is improper to combine references where the references teach away from their combination” (emphasis added; MPEP 2145(X)(D)(2); *In re Grasselli*, 713 F.2d 731, 743, 218 USPQ 769, 779 (Fed. Cir. 1983)). Appellant respectfully notes that “[a] prior art reference must be considered in its entirety, i.e., as a whole, including portions that would lead away from the claimed invention” (emphasis in original; MPEP 2141.02(VI); *W.L. Gore & Associates, Inc. v. Garlock, Inc.*, 721 F.2d 1540, 220 USPQ 303 (Fed. Cir. 1983), *cert. denied*, 469 U.S. 851 (1984)).

Moreover, Appellant notes that “[i]f the proposed modification or combination of the prior art would change the principle of operation of the prior art invention being modified, then the teachings of the references are not sufficient to render the claims *prima facie* obvious” (emphasis added) (MPEP 2143.01; *In re Ratti*, 270 F.2d 810, 123 USPQ 349 (CCPA 1959)). Furthermore, “[i]f the proposed modification would render the prior art invention being modified unsatisfactory for its intended purpose, then there is no suggestion or motivation to make the proposed amendment” (emphasis added) (MPEP 2143.01; *In re Gordon*, 733 F.2d 900, 221 USPQ 1125 (Fed. Cir. 1984)).

A. Claim elements are not disclosed or suggested by Yoo and Apostolopoulos.

Appellant respectfully submits that the combination of Yoo and Apostolopoulos does not teach, describe or suggest each claim element.

The Office Action mailed October 31, 2007, states that “Yoo does not specifically disclose ... caching an intermediate result from one if the stages of said multi-stage process” (page 6, section 5). Appellant agrees with this statement. Apostolopoulos is relied on as overcoming this deficiency.

First, Appellant respectfully submits that Apostolopoulos also does not teach, describe or suggest “caching an intermediate result from one if the stages of said multi-stage process” as claimed.

With reference to Figure 3A of Apostolopoulos, a conventional coder 100 is shown. Coder 100 includes “buffer 114, which generates the first frame of the predictively-coded block-based picture signal as the output of the encoder” (col. 8, lines 29-31). In particular, Appellant respectfully submits that buffer 114 does not cache an intermediate result from coder 100. In contrast, buffer 114 appears to cache the end result of coder 114.

B. There is no motivation to modify Apostolopoulos as suggested.

Appellant respectfully submits that Apostolopoulos also does not teach, describe or suggest “caching an intermediate result from one if the stages of said multi-stage process, said result selected according to said available processing and memory resources” (emphasis added) as claimed.

In the Office Action mailed October 31, 2007, it is asserted that Apostolopoulos discloses “a transcoding method in which buffer data is managed to prevent overflow or underflow (Apostolopoulos: column 8, lines 32-36) and processing resources available are taken into account (Apostolopoulos: column 31, lines 39-43) while performing the transcoding operation” (emphasis added; see Office Action mailed October 31, 2007, at page 6, section 5). Appellant respectfully submits that the rejection is based on a combination of embodiments of Apostolopoulos. Moreover, Appellant respectfully asserts that the relied upon embodiments, illustrated in Figures 3A and 6C of Apostolopoulos, are mutually exclusive, and that there is no teaching or suggestion to modify either of the embodiments in the manner suggested in the Office Action.

With reference to Figure 3A of Apostolopoulos, “a conventional encoder 100 for a picture signal representing a moving picture” is shown. As described above, encoder 100 includes buffer 114.

In contrast, Figure 6C of Apostolopoulos shows a partial encoder 326 in accordance with the invention. In particular, partial coder 326 does not include a buffer. While Appellant acknowledges that Apostolopoulos recites “the coding mode module 273 examine the specific characteristics of the current block, including the objects that appear in the block, how the objects were coded, etc., and then adaptively choose a coding method for the current block from a set of possible coding methods” (col. 31, lines 33-38). However, Appellant respectfully submits that any operation of coding mode module 273 cannot be the basis for caching an intermediate result, since there is no buffer in which to cache the result.



In particular, Appellant respectfully submits that there is no teaching, suggestion or motivation within Apostolopoulos to modify either of the embodiments of Figures 3A or 6C in the manner suggested in the current Office Action, and that the embodiments of Figures 3A and 6C are mutually exclusive. Moreover, by specifically teaching that the conventional encoder 100 of Figure 3A includes buffer 114, and partial encoder 326 of Figure 6C does not include such a buffer, Apostolopoulos teaches away from such a modification and combination of embodiments.

C. There is no motivation to combine the teachings of Yoo and Apostolopoulos.

Appellant respectfully submits that there is no motivation to combine the teachings of Yoo and Apostolopoulos, because Yoo teaches away from the suggested modification.

The Office Action mailed October 31, 2007, states that “Yoo does not specifically disclose ... caching an intermediate result from one if the stages of said multi-stage process” (page 6, section 5). Appellant agrees with this statement. Moreover, Appellant respectfully submits that Yoo teaches away from such a modification.

Appellant respectfully submits Yoo to disclose a transcoding method that includes inverse quantization and re-quantization operations. Specifically, Yoo recites “[i]n FIG. 4, the first row shows detailed processes for the parsing of MPEG-1 syntax elements and processes of inverse-quantizing a DCT coefficient. The second row shows processes of mapping the MPEG-1 syntax elements to MPEG-4 syntax elements. The third row shows processes of forming a MPEG-4 bitstream from the MPEG-4 syntax elements and a quantized DCT coefficient obtained through requantization” (emphasis added; col. 6, lines 8-

15). Specifically, with reference to Figure 4, Appellant respectfully submits that each MPEG-1 syntax element is subjected to inverse-quantization and requantization.

In contrast, embodiments of Apostolopoulos provide “transcoder and transcoding method according to the invention operate in the coded domain and transcode a predictively-coded object-based picture signal into a corresponding predictively-coded block-based picture signal” (emphasis added; col. 4, lines 38-41). With reference to Figure 3B of Apostolopoulos, decoder 120 is shown. “The buffer 121 buffers the predictively-coded block-based picture signal. The demultiplexer 122 removes the frames of the predictively-coded block-based picture signal from the buffer and separates the predictively-coded block-based picture signal into its constituent parts. These parts include blocks of entropy-coded, quantized transform coefficients and, for most of the pictures, a set of entropy-coded motion vectors” (col. 10, lines 21-28). Furthermore, Apostolopoulos discloses that the second frame, and subsequent frames, of predictively-coded block-based picture signal are not subjected to inverse quantization or inverse discrete cosine transform operations (col. 10, line 50, through col. 11, line 19).

As described above, Appellant respectfully submits that Yoo discloses inverse quantization and requantization of each MPEG-1 syntax element. In contrast, Apostolopoulos discloses that the second frame, and subsequent frames, of predictively-coded block-based picture signal are not subjected to inverse quantization or inverse discrete cosine transform operations.

Appellant respectfully submits that the principle of operation of Yoo requires the inverse quantization and requantization of syntax elements. Appellant respectfully submit that modifying the Yoo in the suggested manner would change the principle of operation of Yoo.

Appellant respectfully submits that the combination of Yoo and Apostolopoulos does not render the claimed embodiments unpatentable, because Apostolopoulos does not overcome the shortcomings of Yoo. Appellant respectfully submits that Apostolopoulos does not suggest or provide motivation for modifying Yoo in the manner suggested in the Office Action mailed October 31, 2007.

Appellant respectfully asserts that the combination of Yoo and Apostolopoulos does not satisfy a *prima facie* case of obviousness under 35 U.S.C. § 103(a). Therefore, Appellant respectfully asserts that the combination of Yoo and Apostolopoulos does not teach, disclose or suggest the claimed embodiments of the present invention as recited in independent Claims 1, 10 and 19, that these claims overcome the rejection under 35 U.S.C. § 103(a), and that these claims are thus in a condition for allowance. Appellant respectfully submits that the combination of Yoo and Apostolopoulos also does not teach or suggest the additional claimed features of the present invention as recited in Claims 2-5 that depend from independent Claim 1, Claims 11-14 that depend from independent Claim 10, and Claims 20-23 that depend from independent Claim 19. Therefore, Appellant respectfully submits that Claims 2-5, 11-14 and 20-23 also overcome the rejection under 35 U.S.C. § 103(a), and are in a condition for allowance as being dependent on an allowable base claim.

3. Whether Claims 6-8, 15-18 and 24-27 are unpatentable over Yoo in view of Apostolopoulos, further in view of Panusopone.

The Office Action mailed October 31, 2007, asserts that Claims 6-8, 15-18 and 24-27 are rejected under 35 U.S.C. §103(a) as being unpatentable over Yoo in view of Apostolopoulos, further in view of Panusopone. Appellant has reviewed the Yoo, Apostolopoulos and Panusopone and respectfully submits that the embodiments of the present invention as recited in Claims 6-8, 15-18 and 24-27 are patentable over Yoo in view of Apostolopoulos, further in view of Panusopone for at least the following rationale.

Claims 6-8 depend from independent Claim 1, Claims 15-18 depend from independent Claim 10, and Claims 24-27 depend from independent Claim 19. Hence, by demonstrating that the cited references do not show or suggest the limitations of Claims 1, 10 and 19, it is also demonstrated that the cited references do not show or suggest the limitations of Claims 6-8, 15-18 and 24-27.

As recited above in the discussion of the rejection of Claims 1-5, 9-14 and 19-23, Appellant respectfully submits that the combination of Yoo and Apostolopoulos does not satisfy a *prima facie* case of obviousness under 35 U.S.C. § 103(a).

Moreover, Appellant respectfully submits that the combination of Yoo, Apostolopoulos and Panusopone does not render the claimed embodiments unpatentable, because Panusopone does not overcome the shortcomings of the combination of Yoo and Apostolopoulos. Appellant understands Panusopone to disclose video size conversion and transcoding from MPEG-2 to MPEG-4. Appellant respectfully submits that Panusopone does

not suggest or provide motivation for modifying Yoo and/or Apostolopoulos in the manner suggested in the Office Action mailed October 31, 2007.

Appellant respectfully asserts that the combination of Yoo, Apostolopoulos and Panusopone does not satisfy a *prima facie* case of obviousness under 35 U.S.C. § 103(a). Therefore, Appellant respectfully asserts that the combination of Yoo, Apostolopoulos and Panusopone does not teach, disclose or suggest the claimed embodiments of the present invention as recited in independent Claims 1, 10 and 19, that these claims overcome the rejection under 35 U.S.C. § 103(a), and that these claims are thus in a condition for allowance. Appellant respectfully submits that the combination of Yoo, Apostolopoulos and Panusopone also does not teach or suggest the additional claimed features of the present invention as recited in Claims 6-8 that depend from independent Claim 1, Claims 15-18 that depend from independent Claim 10, and Claims 24-27 that depend from independent Claim 19. Therefore, Appellant respectfully submits that Claims 6-8, 15-18 and 24-27 also overcome the rejection under 35 U.S.C. § 103(a), and are in a condition for allowance as being dependent on an allowable base claim.

### Conclusion

Appellant believes that pending Claims 1-27 are directed to statutory subject matter, that pending Claims 1-5, 9-14 and 19-23 are patentable over Yoo in view of Apostolopoulos, and that pending Claims 6-8, 15-18 and 24-27 are patentable over Yoo in view of Apostolopoulos, further in view of Panusopone.

In summary, Appellant respectfully submits that the rejections of the Claims are improper as the rejection of Claims 1-27 does not support a *prima facie* case of non-statutory subject matter and does not satisfy the requirements of a *prima facie* case of obviousness. Accordingly, Appellant respectfully submits that the rejections of Claims 1-27 under 35 U.S.C. §101 and 35 U.S.C. §103(a) is improper and should be reversed.

The Appellant wishes to encourage the Examiner or a member of the Board of Patent Appeals to telephone the Appellant's undersigned representative if it is felt that a telephone conference could expedite prosecution.

Respectfully submitted,  
WAGNER BLECHER LLP

Dated: April 30, 2008

/John P. Wagner, Jr./  
John P. Wagner  
Registration No. 35,398  
123 Westridge Drive  
Watsonville, CA 95076  
(408) 377-0500

### VIII. Appendix - Clean Copy of Claims on Appeal

1. A method for servicing streaming media comprising:  
receiving said streaming media;  
determining an allocation of available processing and memory resources;  
performing a multi-stage service on said streaming media; and  
caching an intermediate result from one of the stages of said multi-stage process, said result selected according to said available processing and memory resources.
2. The method of Claim 1, wherein said service is a computing-intensive media services.
3. The method of Claim 2, wherein said resources are selected from the group consisting of a transcoder, a first cache, and a second cache.
4. The method of Claim 1, wherein said service comprises transcoding functions.
5. The method of Claim 1, wherein said result is a final transcoding result.
6. The method of Claim 4, wherein said transcoding functions are selected from the group consisting of frame rate reduction, bit rate reduction and resolution reduction.
7. The method of Claim 1, wherein said caching comprises caching intermediate transcoding results of an output stream of said streaming media provided a target bit rate of

said output stream of said streaming media is greater than a data caching rate of said streaming media.

8. The method of Claim 7, wherein said intermediate transcoding results comprise meta data that is selected from the group consisting of pixel, block, macroblock, picture and sequence.

9. The method of Claim 4, wherein said transcoding functions are performed by resources selected from the group that consist of motion vector generator, bit rate controller and parser.

10. A computer useable medium stored thereon a computer program directed to cause a computer to execute a method comprising:

receiving said streaming media;  
determining an allocation of available processing and memory resources;  
performing a multi-stage service on said streaming media; and  
caching an intermediate result from one of the stages of said multi-stage process, said result selected according to said available processing and memory resources.

11. The medium of Claim 10, wherein said service is a computing intensive service.

12. The medium of Claim 11, wherein said resources are selected from the group consisting of a transcoder, a first cache, and a second cache.



13. The medium of Claim 10, wherein said service comprises transcoding functions.

14. The medium of Claim 10, wherein said result is a final transcoding result.

15. The medium of Claim 13, wherein said transcoding functions are selected from the group consisting of frame rate reduction, bit rate reduction and resolution reduction.

16. The medium of Claim 10, wherein said caching comprises caching intermediate transcoding results of an output stream of said streaming media provided a target bit rate of said output stream of said streaming media is greater than a data caching rate of said streaming media.

17. The medium of Claim 16, wherein said intermediate transcoding results comprise meta data that is selected from the group consisting of pixel, block, macroblock, picture and sequence.

18. The medium of Claim 13, wherein said transcoding functions are performed by resources selected from the group that consist of motion vector generator, bit rate controller and parser.

19. A device for servicing streaming data comprising:  
a processor for determining available processing and memory resources; and

memory for caching an intermediate transcoding result from a stage of a multi-stage data service, said intermediate transcoding result selected according to said available processing and memory resources.

20. The device of Claim 19, wherein said service is a computing intensive service.

21. The device of Claim 20, wherein said resources are selected from the group consisting of a transcoder, a first cache, and a second cache.

22. The device of Claim 19, wherein said intermediate transcoding result is selected from any of the respective stages of said multistage service.

23. The device of Claim 19, wherein said result is selected to optimize the balance of processing and memory resources used in providing said service.

24. The device of Claim 19, wherein said device performs transcoding functions that are selected from the group consisting of frame rate reduction, bit rate reduction and resolution reduction.

25. The device of Claim 19, wherein said caching comprises caching intermediate transcoding results of an output stream of said streaming media provided a target bit rate of said output stream of said streaming media is greater than a data caching rate of said streaming media.

26. The device of Claim 25, wherein said intermediate transcoding results comprise meta data that is selected from the group consisting of pixel, block, macroblock, picture and sequence.

27. The device of Claim 24, wherein said transcoding functions are performed by resources selected from the group that consist of motion vector generator, bit rate controller and parser.

## IX. Evidence Appendix

No evidence is herein appended.

X. Related Proceedings Appendix

No related proceedings.